WHAT IS CLAIMED IS:

1. An Ethernet-PON (Passive Optical Network) for integrating broadcast and communication based on a TDM (Time Division Multiplexing) scheme, comprising:

an OLT (Optical Line Terminal) for performing (i) a switching operation on a plurality of digital broadcast/image data received from an external broadcast provider according to respective broadcast/image selection information from users, (ii) time division multiplexing on the digital broadcast/image data to convert it into a broadcast/image signal, (iii) frame-multiplexing the broadcast/image signal and communication data received through an IP (Internet Protocol) network into a single frame, and (iv) electro-optically converting and transmitting the frame;

a plurality of ONTs (Optical Network Terminals), each ONT adapted for receiving an optical signal from the OLT, and for photoelectrically converting the received signal, performing frame & time-slot demultiplexing on the converted signal to output entire received communication signals and broadcast/image information included in a time-slot assigned to the ONT to a corresponding user, and receiving a communication signal and the broadcast/image selection information from the user to output them to the OLT; and

an optical splitter arranged in a path between the OLT and the plurality of ONTs, said optical splitter splitting a signal from the OLT into the plurality of ONTs, coupling signals from the plurality of ONTs, and transmitting the coupled signal to the OLT.

2. The Ethernet-PON according to claim 1, wherein the OLT includes:

a broadcast/image channel selection switch for receiving and switching external MPEG (Motion Picture Experts Group) broadcast and image data, a broadcast/image time-slot multiplexer for assigning broadcast/image channels, output from the broadcast/image channel selection switch to time-slots assigned respectively to the users so as to multiplex the channels;

an Ethernet-PON OLT function processor for performing Ethernet-PON OLT functions;

an IP router for routing a communication signal to an upper level IP network or to the Ethernet-PON OLT function processor;

an Ethernet time-slot matching buffer for storing the communication data from the Ethernet-PON OLT function processor that is transmitted to the OLT for matching/coupling to the time-slot-multiplexed broadcast/image signal output from the time-slot multiplexer;

a frame multiplexer for multiplexing the time-slot-multiplexed broadcast/image signal from the broadcast/image time-slot multiplexer and the communication signal stored in the Ethernet time-slot matching buffer into a single frame;

a first optical transmitter for optically modulating a frame-multiplexed signal outputted from the frame multiplexer, and transmitting the modulated signal as an optical signal of λ_{DOWN}; and

a first optical receiver for receiving an optical signal from the ONTs and converting

the optical signal into an electrical signal.

3. The Ethernet-PON according to claim 1, wherein each of the plurality of ONTs includes:

a second optical receiver for receiving the signal transmitted as the optical signal of λ_{DOWN} from the OLT, and photoelectrically converting the optical signal;

a second optical transmitter for electro-optically converting upstream data and transmitting the upstream data to the OLT;

a frame/time-slot demultiplexer for separating the frame/time-slot-multiplexed broadcast/image and communication signals;

an Ethernet-PON ONT function processor for receiving the communication signal from the frame/time-slot demultiplexer, and performing ONT functions on the function processor; and

a broadcast/image adapter for recovering a time-slot-format broadcast/image signal, separated by the frame/time-slot demultiplexer into an original signal.

4. The Ethernet-PON according to claim 2, wherein each of the plurality of ONTs includes:

a second optical receiver for receiving the signal transmitted as the optical signal of λ_{DOWN} from the OLT, and photoelectrically converting the optical signal;

a second optical transmitter for electro-optically converting upstream data and

transmitting the upstream data to the OLT;

a frame/time-slot demultiplexer for separating the frame/time-slot-multiplexed broadcast/image and communication signals;

an Ethernet-PON ONT function processor for receiving the communication signal from the frame/time-slot demultiplexer, and performing ONT functions on the function processor; and

a broadcast/image adapter for recovering a time-slot-format broadcast/image signal, separated by the frame/time-slot demultiplexer into an original signal.

5. The Ethernet-PON according to claim 1, wherein the single frame obtained by multiplexing the broadcast/image signal and the communication signal is divided into a predetermined number of time-slots, and each of the time-slots includes a broadcast/image sub-time-slot for containing a broadcast/image signal and an Ethernet sub-time-slot for containing a communication signal.

6. The Ethernet-PON according to claim 2, wherein the single frame obtained by multiplexing the broadcast/image signal and the communication signal is divided into a predetermined number of time-slots, and each of the time-slots includes a broadcast/image sub-time-slot for containing a broadcast/image signal and an Ethernet sub-time-slot for containing a communication signal.

7. The Ethernet-PON according to claim 6, wherein the broadcast/image sub-time-slot contains a broadcast/image signal selected by one of the ONTs corresponding to said time-slot's order, and said time-slot is left empty or filled with null data if there is no broadcast/image signal selected by the ONT.

8. The Ethernet-PON according to claim 6, wherein the Ethernet sub-time-slot may contain communication data of every ONT.

9. The Ethernet-PON according to claim 1, wherein the single frame obtained by multiplexing the broadcast/image signal and the communication signal is divided into a sub-frame for broadcast/image signals and a sub-frame for Ethernet communication signals, and the sub-frame for broadcast/image signals includes broadcast/image time-slots, respectively, for containing broadcast/image signals of the ONTs.

10. The Ethernet-PON according to claim 2, wherein the single frame obtained by multiplexing the broadcast/image signal and the communication signal is divided into a sub-frame for broadcast/image signals and a sub-frame for Ethernet communication signals, and the sub-frame for broadcast/image signals includes broadcast/image time-slots, respectively, for containing broadcast/image signals of the ONTs.

11. The Ethernet-PON according to claim 9, wherein the broadcast/image time-slot contains a broadcast/image signal selected by one of the ONTs corresponding to said time-slot's order, and said time-slot is left empty or filled with null data if there is no broadcast/image signal selected by the ONT.

12. The Ethernet-PON according to claim 9, wherein the sub-frame for Ethernet communication signals may contain communication data of every ONT.

13. An Ethernet-PON for integrating broadcast and communication based on a TDM scheme, comprising:

an OLT for performing (i) a switching operation on a plurality of digital broadcast/image data received from an external broadcast provider according to respective broadcast/image selection information from users, (ii) performing time division multiplexing on the digital broadcast/image data to convert it into a broadcast/image signal, (iii) electro-optically converting the broadcast/image signal into a broadcast/image optical signal of λ_B, electro-optically converting communication data received through an IP network into a communication optical signal of λ_{DOWN}, (iv) coupling the broadcast/image optical signal of λ_B and the communication optical signal of λ_{DOWN} into a single signal, and (v) transmitting the single signal;

a plurality of ONTs, each ONT receiving an optical signal from the OLT, separating the received signal into the broadcast/image optical signal of λ_B and the communication

optical signal of λ_{DOWN}, photoelectrically converting the two separated signals, performing time division demultiplexing on the converted broadcast/image signal to convert it into broadcast/image information, outputting the broadcast/image information and the photoelectrically converted communication signal to a corresponding user, and receiving a communication signal and the broadcast/image selection information from the user to output them to the OLT; and

an optical splitter for splitting a signal from the OLT into the plurality of ONTs, coupling signals from the plurality of ONTs, and transmitting the coupled signal to the OLT.

14. The Ethernet-PON according to claim 13, wherein the OLT includes:

a broadcast/image channel selection switch for receiving, switching and outputting an external MPEG broadcast and image data;

a time division multiplexer for assigning broadcast/image channels output from the broadcast/image channel selection switch to time-slots assigned respectively to the users so as to multiplex the channels in a TDM scheme;

a first optical transmitter for optically modulating the time-division-multiplexed broadcast/image signal;

an Ethernet-PON OLT function processor for performing Ethernet-PON OLT functions;

an IP router for routing communication data to an upper level IP network or to the

Ethernet-PON OLT function processor;

a second optical transmitter for optically modulating communication data to be transmitted to the plurality of ONTs;

a first optical receiver for receiving an optical signal from the plurality of ONTs, converting the optical signal into an electrical signal, and transferring the converted signal to the Ethernet-PON OLT function processor;

a broadcast/image channel selection controller for receiving the broadcast/image selection information from the plurality of ONTs through the Ethernet-PON OLT function processor, and transferring a control signal to the broadcast/image channel selection switch to allow the switch to select broadcast/image channels corresponding respectively to the plurality of ONTs; and

a first WDM coupler for coupling the optically modulated communication signal of λ_{DOWN} and the optically modulated broadcast/image signal of λ_B, and to output the coupled signal.

15. The Ethernet-PON according to claim 13, wherein each of the plurality of ONTs includes:

a second WDM coupler for separating an optical signal received from the OLT into a communication signal of λ_{DOWN} and a broadcast/image signal of λ_B;

a second optical receiver for receiving the separated communication signal of λ_{DOWN}, and converting the communication signal into an electrical signal;

a third optical receiver for receiving the separated broadcast/image signal of λ_B, and converting the separated broadcast/image signal into an electrical signal;

an Ethernet-PON ONT function processor, connected to the second optical receiver, for performing ONT functions;

a third optical transmitter for receiving broadcast/image selection information and a communication signal to be transmitted to the OLT from a corresponding user through the Ethernet-PON ONT function processor, and transmitting them as an optical signal λ_{UP}; and

a time division demultiplexer & broadcast/image adapter for receiving the broadcast/image signal converted into the electrical signal, performing time division demultiplexing on the received signal, and recovering a time-slot-format broadcast/image signal, obtained through the time division demultiplexing, into an original signal.

16. The Ethernet-PON according to claim 13, wherein the time-division-multiplexed broadcast/image signal includes time-slots for broadcast/image signals corresponding respectively to the plurality of ONTs, and each of the time-slots includes a predetermined number of sub-time-slots for accommodating the same predetermined number of broadcast/image signals.

17. The Ethernet-PON according to claim 14, wherein the time-division-multiplexed broadcast/image signal includes time-slots for broadcast/image signals corresponding respectively to the plurality of ONTs, and each of the time-slots includes a

predetermined number of sub-time-slots for accommodating the same predetermined number of broadcast/image signals.